content ourselves with a collection of rules and portents, the belief in which we fondly thought the Education Act and the School Board had utterly abolished.

And even here our old friends, when brought out for our edification, are not in the form in which they are familiar, and have been long beloved. Look at the baldness of the assertion—"Expect bad weather if cats wash their faces and lick their bodies." Contrast it with the majestic roll of the well known couplet—

> Puss on the hearth, with velvet paws,
> Sits, wiping o'er her whiskered jaws.

We distinctly feel that we are robbed of something; there is such a pleasant jingle in the old rhyme, that it carried conviction with it. How disappointing, too, to be told only to *expect*. We may just mention, in passing, that this is not the conclusion which we should expect the average fourth standard boy to draw from witnessing the operation on the part of "puss." We should expect that young gentleman to remark that "cat's hair appeared to be slightly hygroscopic."

Altogether this little book reminds us of those admirable compilations in which the theory of whist is sometimes exposed: a vast number of rules is given, which if one could remember and select at the right time he would never make a mistake; but, unfortunately, the combinations on which the rules are founded have a knack of eluding the unlucky player, and never seem applicable to the hand in play, with the consequence that in his efforts to remember some rule, he trumps a thirteenth at an inopportune moment, and earns the contempt of a long-suffering partner. In the same manner one can conceive the city man, armed with this collection of precious and invaluable rules for determining the weather of the coming day, debating with himself whether it was last night or this morning that the sky was red; did he, while shaving, see his dog eating grass on the lawn; and what is the exact age of the moon—finally getting confused by the knowledge that the train is nearly due, rashly seizing his mackintosh and umbrella in the middle of a well-determined summer anticyclone, and so forfeiting his hard-earned position of a trustworthy weather prophet and a man of keenness and nicety of observation.

THE MYCETOZOA.

A Monograph of the Mycetozoa; being a Descriptive Catalogue of the Species in the British Museum. Illustrated with seventy-eight plates and fifty-one woodcuts. By Arthur Lister. (Printed by order of the Trustees. London: 1894.)

ALTHOUGH this is an official publication of the Natural History Department of the British Museum, that part of the title referring thereto is somewhat misleading, because the author includes everything published belonging to this curious group of organisms. At the same time it is not a monograph in the strict sense of the word, because the author had no opportunity of examining a large number of the reputed species inhabiting Central Europe, Scandinavia and North America. Thus, out of 15 species of *Badhamia*, only 9 came under his observation; of *Physarum*, 30 out of 45; of *Didymium*, 8 out of 17, and so on all through. It is true that he repeats, in English, the authors' descriptions, and frequently suggests the affinities of the species in question.

Further, apart from the fact that the book was published under the authority of the Trustees of the British Museum, and the fact that "every species of which I have given the characters can be examined either in bulk, or as a mounted object in the British Museum," it might with equal propriety have been entitled a descriptive catalogue of Mr. Lister's own herbarium, or of the Kew herbarium, because, as he acknowledges, he had full use of the Kew set, including all Berkeley's numerous types.

However, this does not affect the character and quality of the work. Mr. Lister's previous contributions to the literature of these curious and debatable organisms were a sufficient guarantee of good and really original work, and he has no doubt met all reasonable expectations on this point. Indeed few works have recently been issued embodying so much original research. The *Mycetozoa*, as limited by De Bary, Rostafinski, Lister, and others, are essentially the same as the *Myxogastres* of Fries and the *Myxomycetes* of Wallroth. The first name was substituted for the older ones because it was discovered that the spores, instead of producing a mycelium as in fungi, gave birth to swarm-cells which coalesce to form a plasmodium; thus indicating a relationship with the lower forms of animal life. Mr. Lister adopts this designation, and defines the group as follows:—

"A spore provided with a firm wall produces on germination an amœboid swarm-cell which soon acquires a flagellum. The swarm-cells multiply by division and subsequently coalesce to form a plasmodium which exhibits a rhythmic streaming. The plasmodium gives rise to fruits which consist of supporting structures and spores; in the *Endosporeæ*, these have the form of sporangia, each having a wall within which the free spores are developed. A capillitium or system of threads forming a scaffolding among the spores is present in most genera. In the *Exosporeæ* the fruits consist of sporophores bearing numerous spores on their surface."

He then proceeds to describe in detail the development and various stages, in fact the life history of these organisms, and this he has done in a simple and lucid style worthy of all admiration. The movements of the swarm-cells—creeping and dancing movements—are most interesting, as well as that of the plasmodium, or aggregation of cells; but the feeding of the swarm-cells is most exciting. Mr. Lister had previously published accounts of his observations of the ingestion of food-material by the *Mycetozoa* in this stage of their development; yet a short extract relating to this process is not out of place:—

"If bacteria are introduced into a cultivation of swarm-cells on the stage of the microscope, they are seen to be laid hold of by the pseudopodia and drawn into the body of the swarm-cells, where they are enclosed in a digestive vacuole. Several bacteria are brought in turn to the same chamber, or fresh captures are conveyed into one or more additional vacuoles. The protrusion of pseudopodia usually ceases after such ingestion, and that part of the swarm-cells takes a rounded form. In the course of an hour or two the bacteria are assimilated and the digestive vacuoles disappear. Unicellular algæ and inorganic matter are sometimes taken in, which after a time are again discharged. Both ingress and egress are observed to take place only at the posterior end."

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It should be explained that an ordinary swarm-cell in the feeding stage is an elongated body tapering at one end into a long cilium or lash, and more or less truncated at the end with several short cilia, the so-called pseudopodia. Within the body of the cell is a nucleus and several vacuoles.

With regard to hybrids between the plasmodia of different species, Mr. Lister is in accord with De Bary, and doubts the accuracy of Mr. Massee's observations.

Another point of great interest is the very wide geographical distribution of most of the species; and the main characters, Mr. Lister states, are remarkably constant in specimens gathered in all parts of the world. Mr. Lister gives a number of instances in which specimens obtained from Europe, India, and North and South America are identical in the most minute microscopic detail. But there are exceptions, in which individuals of the same species from tropical and temperate regions exhibit differences in form; the tropical ones being of more elegant growth.

In his description of the sclerotium, or resting stage, of the plasmodia, Mr. Lister states that the sclerotium of *Badhamia utricularis* can be revived, after preservation in a dry state for three years, by being placed in water. He also gives the results of a number of interesting experiments on the vitality of various other *Mycetozoa*. Altogether Mr. Lister's "Introduction" is most instructive, and his descriptions are so clear, that this book should go far to popularise the study of these organisms. The plates, which are collotype reproductions of water-colour drawings, are very good, but much of the beauty of the originals is lost in the process. It is a pity that they were not reproduced in colour. And this leads one to ask why the coloured figures in Massee's "Monograph" are not cited. It is true there are references to the pages of that work, which would lead one to the figures, if one knew of their existence. It is disappointing, too, that the author has attempted no review of the previously existing literature, and has not even thought it necessary to devote two or three pages to bibliography. These omissions are all the more surprising when one considers the facilities the author enjoyed in the prosecution of his studies.

A NEW WORK ON DYEING.

La Pratique du Teinturier. By Jules Garçon. Two vols. Pp. 148 and 391. (Paris: Gauthier-Villars et Fils, 1893 and 1894.)

THE art of dyeing has in recent years developed so rapidly—having been practically revolutionised and to a large extent remodelled during the last thirty years—that text-books and works of reference dealing with the subject rapidly become defective. We are therefore always glad to welcome any new work which, as far as possible, epitomises the information up to date.

The great energy and enterprise exhibited by the large firms of colour manufacturers in such a marked degree, has, moreover, a tendency to develop what may be distinguished as the *art* of dyeing, more rapidly than the *handicraft*. It is, therefore, pleasant to note that, as an engineer, the author of the book under review fully appreciates the importance of the manipulative and mechanical side of the subject, and gives a lucid description of many of the recently introduced appliances.

The plan of the book differs somewhat from that usually found in works on dyeing. There is, for instance, no description of the character and properties of the textile fibres or of the colouring matters; but the various theories which have been put forward to account for dyeing processes, although of necessity based on such facts, are discussed at considerable length. Again, chemistry, as expressed by symbols and equations, is conspicuous by its absence; but a lengthy chapter on the elements of chromatics is introduced. However, as the book is as yet incomplete (a third volume being in course of preparation), it is too early to definitely consider these as omissions.

Volume i. contains a very short and sketchy historical introduction, followed by a few notes regarding the relative advantage of the natural and artificial dye-stuffs. A classification of the colouring matters—following the usual lines—is then given, with some very general notes with regard to the application of each class of colours to the various fibres. This section of the book might certainly have been considerably extended with advantage, since undue compression necessitates a too-free generalisation and an inadequate explanation of the facts. For instance, it is not sufficient to state (p. 13) that the acid used in dyeing with sulphonic acid colouring matters (always employed as salts) serves to liberate the free colour acid. This is really a very secondary action, requiring only a small fraction of the amount of acid used, the principal function of which is to prepare the wool for combination with the dye.

The methods of dyeing linen, jute, China grass, feathers, &c., are also noticed, a useful bibliography on the dyeing of feathers being introduced. This commendable feature is also noticed in several other sections of the book.

The second part of the first volume is concerned with the actual processes of scouring, dyeing, and finishing. The space allotted to this is again very small; the description of the bleaching of cotton and of wool occupying less than half a page. Some useful hints are, however, given with respect to the choice of dye-stuffs, the storing, dissolving and examination of colours, the causes of defects, &c.

M. Garçon devotes considerable attention to the question of the fastness of colours, and discusses the influence, in respect to this property, of the nature of the fibre and the colouring matter employed, of the method of applying the colour, of the character of the light and the atmospheric conditions. With regard to the relationship between the chemical constitution of the colouring matter and its behaviour on exposure to light, it is noted that although most members of any particular group act in a similar manner, a slight difference in constitution is sometimes sufficient to cause a great difference in permanence; thus, although most of the anthracene colours are "fast," and all the triphenylmethane derivatives "fugitive," gallein is much more resistant than the closely allied eosin dyes, and by simply sulphonating indigotin, one of the most permanent dyes is changed into a very fugitive colour. It may be added that derivatives of methyl anthracene appear to be comparatively fugitive to light.

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